National Institutes of Health

NIH HTML-Formatted Data Stream Implementation Guide For the Professional Profile

Version 1.0

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1. Purpose and Business Overview

1.1 Document Purpose

The purpose of the "NIH HTML-Formatted Data Stream Implementation Guide for the Professional Profile (PPF)" is to provide standardized data requirements and content to all users interested in submitting PPF data to the National Institutes of Health (NIH) via Hypertext Markup Language (HTML) formatted data streams. Use of HTML-formatted data streams requires a data dictionary and a set of syntax rules. Both the PPF data dictionary [1] and syntax rules [2] are maintained and published by the Federal Demonstration Partnership (FDP).

This guide provides a detailed explanation of the PPF data dictionary and syntax rules, including the identification of valid code tables. This will aid users in the successful encoding of PPF data from a proprietary format to an HTML-formatted data stream (called an HTML-stream within the scope of this guide).

Expected users of this implementation guide include NIH grantee organizations and third party vendors that conduct business with NIH on behalf of a grantee organization (i.e., grantee organization agents).

1.2 Version and Release

The PPF data dictionary is based on the Accredited Standards Committee (ASC) X12 194 transaction set [3]; specifically, the X12 standards approved for publication in December of 1997, referred to as Version 4 Release 1 (004010).

1.3 Business Usage and Definition

NIH has deployed a pilot HTML-stream system to receive and validate PPF data. Grantee organizations (or their agents) use the PPF data dictionary and encoding rules to format PPF data for transmission to this pilot system.

The NIH PPF pilot is being deployed as a phased implementation. Phase one, for which this manual is written, accepts only test data. Additional limitations are documented in the PPF data dictionary implementation guidelines (section 3).

1.4 References

1. "Data Dictionary for the Grant Application." Federal Demonstration Partnership. July 1998.
2. "Syntax Rules for HTML-Formatted Data Streams." Federal Demonstration Partnership. January 1998.
3. "ASC X12 194 Transaction Set. Federal Implementation Conventions." Version 004010. September, 1998.
4. "Table Extensions for the Common Gateway Interface." Buccigrossi, Robert. Turner Consulting Group. February 4, 1997.

1.5 Terms and Abbreviations

194	X12 Grant or Assistance Application
ASC	Accredited Standards Committee
ASCII	American Standard Code for Information Interchange
DE	Data Element
DUNS	Data Universal Numbering System
EDI	Electronic Data Interchange
FDP	Federal Demonstration Partnership
HTML	Hypertext Markup Language
IC	Implementation Convention
NIH	National Institutes of Health
PHS	Public Health Service
PPF	Professional Profile

1.6 Organization of Document

This document, the "NIH HTML-Formatted Data Stream Implementation Guide for the Professional Profile", contains four major sections. Section 1 introduces the manual. Section 2 provides a data overview. Section 3 presents the PPF data dictionary implementation guidelines, and section 4 specifies the HTML-stream syntax. This document also contains one appendix, which provides a sample HTML-stream for the PPF.

1.7 How to Use This Document

This manual is written for the technical user who understands software programming terms and concepts. It can be used as a standalone document, because it reproduces both the relevant PPF data dictionary and syntax rules (from the FDP), as well as the relevant X12 194 code tables.

1.8 Respondent Burden

This information collection activity is in the process of obtaining an OMB number.

The Public Health Service (PHS) estimates that it will take approximately 2 hours to complete the information collection requirements for a profession profile. If you have any comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, send comments to: NIH, Project Clearance office, 6701 Rockledge Drive, MSC 7730, Bethesda, MD 20892-7730, ATTN: PRA (0925-0001). **Do not send professional profiles to this address.**

2. Data Overview

2.1 Information Flows

The transmission of PPF data from the grantee community to NIH takes place as shown:
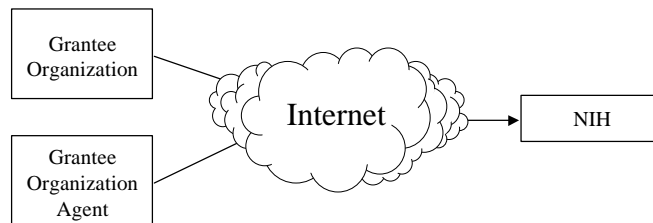
2.2 Data Usage by Business Usage

The PPF data dictionary is categorized into *entities*. An entity is a collection of related data elements. For example, all data elements relevant to an organization are specified in the ORGANIZATION entity. The reader is advised to view these entities as tables in a relational database. This means that grantee organizations must map data from their grant administration databases to the corresponding PPF entities and data elements.

The PPF data dictionary comprises 10 distinct entities. The hierarchical structure of these entities is depicted in the following diagram. Indentation is used to delineate ranks in the hierarchy.

INDIVIDUAL
    contains ORGANIZATION
    contains EDUCATION_TRAINING
        contains ADVISORS
    contains HONORS
    contains RESEARCH_PROF_EXPERIENCE
    contains PUBLICATIONS
    contains MEMBERSHIPS/ASSOCIATIONS
    contains ADVISEES
    contains COLLABORATORS

2.3 General Processing Rules

NIH applies some general rules when processing data streams. The NIH processing rules for HTML-streams containing PPFs can be divided into *Entity Rules* and *Data Element Rules*.

2.3.1 Entity Rules

1. If a data stream contains an entity that is not recognized, the data stream is rejected.
2. If a data stream contains more than one instance of an entity that does not permit duplicates, the data stream is rejected.
3. If an entity violates the entity hierarchy (e.g., if ADVISORS appears under INDIVIDUAL, instead of EDUCATION_TRAINING), the data stream is rejected.
4. If an entity is required and an instance of the entity is not present in the data stream, the data stream is rejected.
    *   The only required entities are INDIVIDUAL and ORGANIZATION.

2.3.2 Data Element Rules

1. If an entity contains a data element that is not recognized, the data stream is rejected.
2. If an entity contains more than one instance of a data element that does not permit duplicates, the data stream is rejected.
3. If a data element is required and an instance of the data element is not present in the entity, the data stream is rejected.
4. If a data element violates a length constraint, the data stream is rejected.
5. If a data element contains a code value that is not permitted, the data stream is rejected.

2.4 ASCII Text

When submitting PPF data to NIH via an HTML-stream, grantee organizations encode the data using the 7-bit American Standard Code for Information Interchange (ASCII) bit pattern. This encoding scheme does not permit the representation of many foreign language characters (e.g., the Ä). This limitation is most apparent when specifying publication titles containing special characters (e.g., mathematical characters). For the PPF pilot, NIH recommends providing a brief description of the special character. For example, use *delta* in lieu of δ, or use *small a, umlaut* in lieu of ä.

3. PPF Data Dictionary Implementation Guidelines

Grantee organizations can use HTML-streams to submit PPF data to NIH. Multiple PPFs can be submitted via a single data stream. For phase one of the NIH pilot, the PPFs shall contain test data.

The following table lists the entities that comprise the PPF data dictionary. For each entity, attributes such as whether the entity is required, whether duplicate values are permitted, and whether NIH supports the entity are provided.

Following the table is the data element specification for each entity. Note that some attributes are bold and italic. These attributes have an NIH value that is different from the FDP value.

Entity Name	Required	Duplicates Allowed	NIH
INDIVIDUAL	Yes	No	Yes
ORGANIZATION	Yes	*No*	Yes
EDUCATION_TRAINING	No	Yes	Yes
ADVISORS	No	Yes	No
HONORS	No	Yes	Yes
RESEARCH_PROF_EXPERIENCE	No	Yes	Yes
PUBLICATIONS	No	Yes	Yes
MEMBERSHIPS/ASSOCIATIONS	No	Yes	Yes
ADVISEES	No	Yes	No
COLLABORATORS	No	Yes	No

3.1 INDIVIDUAL Entity

The following table defines the data elements for the INDIVIDUAL entity. If the INDIVIDUAL entity is viewed as a database table, each data element is analogous to a column in the table.

For the INDIVIDUAL entity (as well as all other entities), the following information is provided:

1. Data Element Name - the name of the data element.
2. Data Type - the type of the data element. The following types are used:
   - AN — Alphanumeric
   - DATE — Format is CCYYMMDD (e.g., Jan 13, 2001 is 20010113)
   - ID — Identifier (Alphanumeric, but values are predefined)
   - NUM — Numeric (Treated as number or string, depending on context)
3. Min Len - the minimum number of characters permitted for the data element.
4. Max Len - the maximum number of characters permitted for the data element.
5. Dupl - a boolean indicating whether the data element can have multiple values.
6. Req - a boolean indicating whether the data element must be present.
7. NIH - a boolean indicating whether NIH supports the data element.
8. Code List - a list of permitted values for the data element.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Name_Last	AN	1	*30*	NO	YES	YES	
Name_First	AN	1	25	NO	YES	YES	
Name_Middle	AN	1	25	NO	NO	YES	
Name_Prefix	AN	1	10	NO	NO	YES	
Name_Suffix	AN	1	*5*	NO	NO	YES	
Position_Title	AN	1	*40*	*NO*	NO	YES	
GUIDe	AN	6	20	NO	NO	YES	
SSN	AN	9	9	NO	NO	YES	
Ethnic_Background	ID	1	1	NO	NO	YES	"7" Not Provided "A" Asian "B" Black "C" Caucasian "H" Hispanic "I" American Indian or Alaskan Native
Gender	ID	1	1	NO	NO	YES	"F" Female "M" Male
Citizenship_Status	ID	1	1	NO	NO	NO	
Disabled	ID	1	1	NO	NO	NO	
Disability_Description	AN	1	80	YES	NO	NO	
Birth_Date	DATE	8	8	NO	NO	YES	

3.2 EDUCATION_TRAINING Entity

Use the EDUCATION_TRAINING entity to specify information pertaining to an academic degree.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Conferring_Institution	AN	1	35	NO	NO	YES	
Degree_Earned	ID	3	3	NO	NO	NO	
Degree_Description	AN	2	5	NO	NO	YES	See note 1.
Degree_Date	DATE	8	8	NO	NO	YES	
Field_of_Study/Major	AN	1	80	*NO*	NO	YES	
Specialization_Area	AN	1	80	*NO*	NO	YES	

1   NIH recognizes the following degrees for Degree_Description:

AB	CHB	DNS	LLB	MLS	OD
AS	DC	DNSC	LLD	MN	PHB
BA	DDS	DO	LLM	MPH	PHD
BCH	DED	DPH	MA	MPHN	PHRM
BD	DENG	DSC	MB	MPM	RN
BENG	DHS	DSN	MBBS	MRCP	SCD
BM	DLS	DSW	MCHD	MS	VMD
BS	DMD	DVM	MCHR	MSCD	OTH (other)
BSD	DMS	DVS	MD	MSD	
BSN	DMSC	EDD	MDS	MSN	
BSNE	DN	HS	MEDS	MSNE	
BSW	DNED	JD	MENG	MSW	

3.3 HONORS Entity

Use the HONORS entity to provide information relating to an honor.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Honor	AN	1	88	NO	NO	YES	

3.4 MEMBERSHIPS/ASSOCIATIONS Entity

Use the MEMBERSHIPS/ASSOCIATIONS entity to provide information on any Federal Government public advisory committees.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Membership/Association	AN	1	131	NO	NO	YES	

3.5 ORGANIZATION Entity

Use the ORGANIZATION entity to specify organizational data about an individual. The data elements: Emp_Org_DUNS, Emp_Org_Name1, Emp_Org_Maj_Subdiv, and Emp_Org_Department, can only used to identify an individual; i.e., their profiles values registered with NIH cannot be modified via the HTML-stream.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Emp_Org_DUNS	ID	9	*10*	NO	NO	YES	
Emp_Org_Name1	AN	1	35	NO	*YES*	YES	
Emp_Org_Name2	AN	1	35	NO	NO	NO	
Emp_Org_Maj_Subdiv	AN	1	45	NO	NO	YES	
Emp_Org_Department	AN	1	45	NO	NO	YES	
Emp_Org_Address1	AN	1	35	NO	NO	YES	
Emp_Org_Address2	AN	1	35	NO	NO	YES	
Emp_Org_City	AN	1	30	NO	NO	YES	
Emp_Org_County	AN	1	30	NO	NO	YES	
Emp_Org_State/Province	ID	2	2	NO	NO	YES	
Emp_Org_Zip/Postal_Code	ID	3	*9*	NO	NO	YES	
Emp_Org_Country	ID	2	3	NO	NO	YES	ISO-3166
Mail_Stop_Code	AN	1	20	NO	NO	YES	
Telephone_Number	NUM	10	16	NO	YES	YES	
Facsimile_Number	NUM	10	16	NO	NO	YES	
Email_Address	AN	7	80	NO	NO	YES	
URL	AN	10	80	NO	NO	NO	

3.6 PUBLICATIONS Entity

Use the PUBLICATIONS entity to provide the Medline Accession number and/or freeform text for a publication.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Publication_Medline_Accession	AN	10	10	NO	NO	YES	
Publication_Reference	AN	1	1800	NO	NO	YES	

3.7 RESEARCH_PROF_EXPERIENCE Entity

Use the RESEARCH_PROF_EXPERIENCE entity to provide CV data.

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Experience	AN	1	371	NO	NO	YES	

The following entities are not supported by NIH.

3.8 ADVISEES Entity

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Advisee	AN	1	191	NO	NO	NO	
Grad_Students_Advised	NUM	1	4	NO	NO	NO	
Doctoral_Postdoc_Advised	NUM	1	4	NO	NO	NO	

3.9 ADVISORS Entity

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Advisor	AN	1	191	NO	NO	NO	

3.10 COLLABORATORS Entity

Data Element Name	Data Type	Min	Max	Dupl	Req	NIH	Code List
Collaborator	AN	1	255	NO	NO	NO	

4. HTML-Formatted Data Stream Syntax

The syntax for HTML-formatted data streams is based on the data stream produced when a user *submits* (i.e., selects the *submit* button on) a Web form. Upon submission of a Web form, a data stream is generated such that the information input by the user is represented by a sequence of *key/value* pairs. The *key* portion is the variable name assigned by the Web form creator. The *value* portion is the information entered by the user submitting the form.

An example helps clarify this concept. Assume that a Web form contains a text box for entering a person's last name, that the form creator assigns the variable name *Name_Last* to the text box, and that the user enters the name *Ptolemy* in the text box. When the user submits the form, the resulting data stream for that text box is:

> Name_Last=Ptolemy

As seen from this trivial example, the HTML-formatted data stream syntax has two components:

- a set of permitted variable names (these are the data element names defined in the PPF data dictionary), and
- a set of rules for combining these data elements (i.e., a grammar)

4.1 Data Element Rules

There are certain rules and restrictions when specifying the *value* portion of data elements. The following rules and restrictions are carried over from the X12 194 transaction set.

1. When specifying numerical data elements, special formatting characters must not be included. For example, telephone numbers must not contain parentheses or dashes, and social security numbers, DUNS numbers, and 9-digit zip codes must not contain dashes.

Other rules are specific to HTML-formatted data streams. These rules and restrictions are listed below.

1. Entities and data element names are not case sensitive.
2. Spaces are specified with the character "+". For example, the name "Tycho Brahe" is represented as "Tycho+Brahe".
3. There are certain *special characters* in HTML-formatted data streams. When representing these special characters as text in the data element *value* portion, they must be specified as a multi-character sequence. The following table lists each special character and its associated multi-character sequence. Note that when determining the

length of a data element value, each special character is counted as one character, despite its multi-character representation.

Description	Character	Specification in Data Stream
ampersand	&	&
less-than	<	<
greater-than	>	>
quotation mark	"	"
plus	+	+
semi-colon	;	;
tab			
new line		

4.2 Grammar Rules

Section 4.1 provides the information necessary to specify any single data element. This section provides the rules for specifying a sequence of data elements as an HTML-stream.

4.2.1 Basic Rules

There are 5 basic rules for combining data elements into an HTML-formatted data stream.

1. The HTML-formatted data stream is a continuous sequence of data elements; no white space is permitted between data elements.
2. All data elements must appear within an entity.
3. Entities can appear in any order (within the constraints of the relevant hierarchy).
4. Data elements comprising an entity can appear in any order.
5. The delimiter between data elements is the character "&".

4.2.2 Specifying Entities With Multiple Values

Many entities permit duplicates. This simply means that there can be multiple instances of an entity. For example, one instance of the EDUCATION_TRAINING entity can be used to specify one degree for a person. To specify a second degree for that person, a second instance of the entity is used.

To better understand how entities that allow duplicates are handled within an HTML-formatted data stream, the entities should be viewed as tables in a relational database. The set of data elements that comprise an entity is represented as a row in that table. To

delineate between tables (i.e., entities) and rows within a table (i.e., instances of an entity) the *Ordered/Boundary Method* [4] is employed.

The Ordered / Boundary Method uses the tags BEGIN and END to delineate tables, and the tag NEXT to delineate rows within a table. For example, given the following data elements in the EDUCATION_TRAINING table:

Conferring Institution	Degree Description	Degree Date	Field_of_Study/ Major
University of Bethesda	PHD	05/01/95	Biology
University of Bethesda	BS	12/01/92	Computer Science

the resulting HTML-formatted data stream is:

```
BEGIN=EDUCATION_TRAINING
        &Conferring_Institution=University+of+Bethesda
        &Degree_Description=PHD
        &Degree_Date=19950501
        &Field_of_Study/Major=Biology
&NEXT=EDUCATION_TRAINING
        &Conferring_Institution=University+of+Bethesda
        &Degree_Description=BS
        &Degree_Date=19921201
        &Field_of_Study/Major=Computer+Science
&END=EDUCATION_TRAINING
```

Note that the HTML-formatted data stream would be one continuous stream. The above formatting is provided only for readability.

4.2.3 Specifying Data Elements With Multiple Values

Some data elements are permitted multiple values. For example, an individual's degree can have multiple *majors*. To identify multiples values associated with a data element, simply repeat the data element for each value. This concept is reflected in the following example table and data stream.

Conferring Institution	Degree Description	Degree Date	Field_of_Study/ Major
University of Bethesda	PHD	05/01/95	Biology
University of Bethesda	BS	12/01/92	Computer Science Philosophy

The resulting HTML-formatted data stream becomes[1]:

```
BEGIN=EDUCATION_TRAINING
        &Conferring_Institution=University+of+Bethesda
        &Degree_Description=PHD
        &Degree_Date=19950501
        &Field_of_Study/Major=Biology
&NEXT=EDUCATION_TRAINING
        &Conferring_Institution=University+of+Bethesda
        &Degree_Description=BS
        &Degree_Date=19921201
        &Field_of_Study/Major=Computer+Science
        &Field_of_Study/Major=Philosophy
&END=EDUCATION_TRAINING
```

Again, the formatting is provided only for readability.

---

[1] Note that NIH does not permit multiple majors to be specified for a degree.

APPENDIX A. SAMPLE HTML-FORMATTED DATA STREAM

This appendix contains a sample NIH Biographical Sketch and the corresponding HTML-stream. All data in this PPF are fictitious.

Note that an HTML-formatted data stream is a continuous stream. The formatting in this appendix is provided only for readability.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Photocopy this page or follow this format for each person.

NAME	POSITION TITLE
Dr. Galileo N. Galilei	Professor and Chair of Microbiology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Northern Italy	BS	1959	Chemistry
University of Pisa	MD	1963	Microbiology

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. **DO NOT EXCEED TWO PAGES.**

Experience:

1963-1974: University of California, Los Angeles. Department: Medicine. Medical Resident.
1974-1992: University of California, San Diego. Department: Medicine. Associate Professor of Medicine.
1992-1997: University of Bethesda. School: Biochemistry. Department: Microbiology & Molecular Biology.
            Professor and Chair of Microbiology

Honors:

Years: 1994-1995 JM Osbourne Preventive Medicine Award
Years: 1995-1996 American Society for Immunology Travel Award

Memberships:

Federal Advisory Committee Membership.
Agency: NIDDK Title: GMA-2 Study Section Start Year: 01/01/93 End Year: 01/01/97

Publications:

1. Galilei, G., Copernicus, N., Computer assisted identification and classification of infectious and parasitic diseases. Nucleiic Acids Research (1994) 3696-3703.
2. Galilei, G., Sitterly, C. In vitro molecular techniques to study gene structure regulation in bacteria. Microbiol 101 (Oct 1996) 989-996.

```
BEGIN=INDIVIDUAL
        &Name_Last=Galilei
        &Name_First=Galileo
        &Name_Middle=N
        &Name_Prefix=Dr
        &GUIDe=DrGGalilei
        &Position_Title=Professor+and+Chair+of+Microbiology
        &Birth_Date=19371106
        &Gender=M
        &Ethnic_Background=7
        &SSN=123456789

        &BEGIN=ORGANIZATION
                &Emp_Org_Duns=112233445
                &Emp_Org_Name1=University+of+Bethesda
                &Emp_Org_Maj_Subdiv=School+of+Biochemistry
                &Emp_Org_Department=Microbiology+&amp;+Molecular+Biology
                &Emp_Org_Address1=Atherosclerosis+Research+Unit
                &Emp_Org_Address2=461+Ocean+Blvd.
                &Mail_Stop_Code=7750
                &Emp_Org_City=Bethesda
                &Emp_Org_County=Montgomery
                &Emp_Org_State/Province=MD
                &Emp_Org_Zip/Postal_Code=20892
                &Emp_Org_Country=US
                &Telephone_Number=3015551478
                &Facsimile_Number=3015552685
                &Email_Address=ggalileo@ub.edu
        &END=ORGANIZATION

        &BEGIN=EDUCATION_TRAINING
                &Conferring_Institution=University+of+Pisa
                &Degree_Date=19630501
                &Degree_Description=MD
                &Field_of_Study/Major=Microbiology
                &Specialization_Area=Microbial+Genetics
        &NEXT=EDUCATION_TRAINING
                &Conferring_Institution=University+of+Northern+Italy
                &Degree_Date=19590501
                &Degree_Description=BS
                &Field_of_Study/Major=Chemistry
        &END=EDUCATION_TRAINING

        &BEGIN=RESEARCH_PROF_EXPERIENCE
```

&Experience=1992-1997:+University+of+Bethesda.+School:+Biochemistry.+Department:+Microbiology+&+Molecular+Biology.
	Professor+and+Chair+of+Microbiology.
&NEXT=RESEARCH_PROF_EXPERIENCE
&Experience=1974-1992:+University+of+California,+San+Diego.+Department:+Medicine.+Associate+Professor+of+Medicine.
&NEXT=RESEARCH_PROF_EXPERIENCE
&Experience=1963-1974:+University+of+California,+Los+Angeles.+Department:+Medicine.+Medical+Resident.
&END= RESEARCH_PROF_EXPERIENCE

&BEGIN=HONORS
&Honor=Years:+1995-1996+American+Society+for+Immunology+Travel+Award
&NEXT=HONORS
&Honor=Years:+1994-1995+JM+Osbourne+Preventive+Medicine+Award
&END= HONORS

&BEGIN=MEMBERSHIPS/ASSOCIATIONS
&Membership/Association=Federal+Advisory+Committee+Membership
Agency:+NIDDK+Title:+GMA-2+Study+Section++Start+Year:+01/01/93+End+Year:+01/01/93.
&NEXT=MEMBERSHIPS/ASSOCIATIONS

&BEGIN=PUBLICATIONS
&Publication_Reference=Galilei,+G.,+Copernicus,+N.,+Computer+assisted+identification+and+classification+of+infectious+and+parasitic+diseases.+Nucleic+Acids+Research.+38+(1994)+3696-3703.
&NEXT=PUBLICATIONS
&Publication_Reference=Galilei,+G.,+Sitterly,+C.,+In+vitro+molecular+techniques+to+study+gene+structure+regulation+in+bacteria.+ Microbiol.+101+(Oct+1996)+989-996.
&END=PUBLICATIONS

&END=INDIVIDUAL